Teaching Military Medicine: Readiness & Warfare Issues

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Key Topics

- Profiles, Medical boards, & readiness
- Immunizations & pre-deployment prep
- Environmental exposures
- Disease & non-battle injuries
- Battle injuries—blast & crush injuries
- NBC Warfare
- Combat stress, post-deployment symptoms

Profiles (Limited Duty)

- Temporary
  - 30 days on sick slip (DD 689)
  - 90 days on DA 3349
  - NP/PA can do, but need cosign for >30 days
- Permanent
  - 2 signatures, plus division chief
  - Not expected to improve
  - P3 or P4 requires medical board

Detailed in AR 40-501

Profile Categories

P—physical capacity

U—upper extremities, C/T spine

L—lower extremities, L/S spine

H—hearing

E—vision

S—psychiatric

Profile Scale

1. No or minimal limitations
2. Some limitations
3. Assignment limitations/restrictions
4. Severe limitations

Profile codes

A No assignment limitations—fully fit

B Some limits that may protect vs. further damage a/o disqualify from some MOS's

C No crawling, running, jumping, standing for long periods (ASPVD, DJD)

D No mandatory strenuous physical activity (ASCAD)

H No driving, , machines, heights (Sz d/o)

Effective profiles

- Specific instructions
- Lay terms
- Use specialists for permanent profiles
- Be realistic, not:
  - "no standing"
  - "no exposure to temps < 40 degrees"
  - "no wearing gas mask under water"

Medical Evaluation Boards

- For condition that may render unfit by AR 40-501, Ch 3
- Complete SF 88 & 93, Permanent Profile
- Dictate Narrative Summary
- Sign, and have chief of service sign (3 MDs for USAF)
- Refer to PEBLO, then to PEB

Narrative Summary (1 of 3)

- Chief complaint
- Why referred--functional impairments
- All other conditions (list)
- History of present illness--including rx
- PMH/Meds/Allergies
- Review of Systems

Narrative Summary (2 of 3)

- Physical examination
  - VS: Ht, Wt, pulse, BP
  - Detail exam as appropriate
- Lab & X-ray data
- Consultations for conditions that meet AR 40-501 criteria
- Social/Family history
- Mental status exam

Narrative Summary (3 of 3)

- Present status: limitations of each condition, & if relevant, combined effect of all
- Diagnoses, w/ applicable paragraph of AR 40-501, EPTS or line of duty
- Duty restrictions in lay terms
- “Medically unacceptable according to…”
- PEB determines fitness for duty

Psychiatric diagnoses

- DSM Dx, w/ severity & chronicity
- Manifest by: symptoms
- Stressors: list, w/severe/moderate/minimal
- Predisposition: none/mild/mod/severe
- ♠ Impairment for further military duty
- ♥ Impairment for social & industrial adaptability

Immunizations

- Anthrax
  - some acute effects, esp. localized eryth/nodule
  - fatal disease w/o prevention or early rx
  - no evidence of squalene adjuvant
  - no association with Gulf War illnesses
- Botulinum
  - no significant adverse effects
- Multiple vaccines: theory, no evidence

Chemoprophylaxis

- Pyridostigmine bromide
  - acetylcholinesterase inhibitor, quaternary amine
  - protects vs. nerve agents soman, tabun
  - short half-life; some acute effects
  - doses much lower than for myasthenia
  - may enter CNS under stress?
- DEET & permethrin
  - safe, widely used, no synergistic adversity

Environmental concerns

- Water & food supply, vector control key issues--dramatically improved over time
- Depleted uranium
- Industrial waste products
  - PCBs in Bosnia
  - Oil well fires in Kuwait
- CARC paint, fuels, petrochemicals
- Cramped quarters, isolation

Disease & non-battle injuries

- Preventive measures highly effective
- Dramatic decline in DNBI seen in Gulf War and other recent deployments
- Sports/orthopedic injuries still common
- Physical and psychological trauma

Blast injury management

- 1° & 2° survey, BLS & ACLS
- Exam:HEENT (TMs, emboli), skin (SQ)
- Image head, chest
- Limit activity; provide O2
- A/E & mech vent may ↑ barotrauma
- Chest tube for pneumothorax
- Art. air emboli resp for most early death; lie down w/ injured lung dependent

Crush injuries

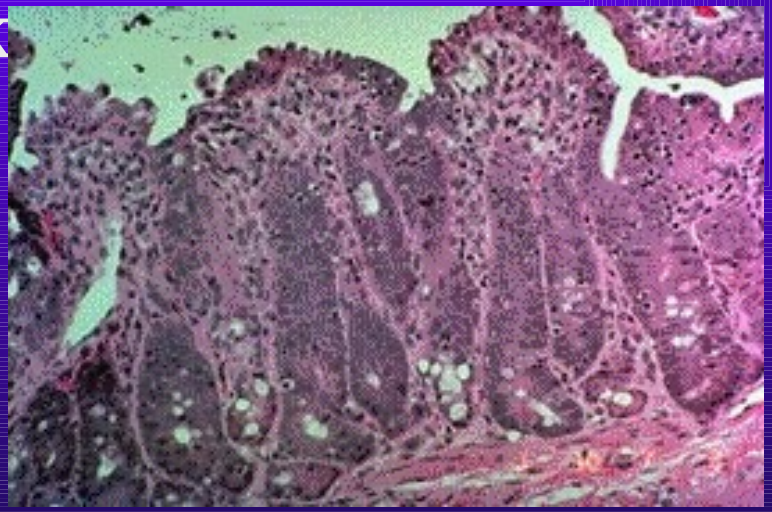
- Muscle damage release K+, myoglobin ↑ ↓ ↓ ↑
- Within 2 hrs, K+, Ca++, PO4, uric a., metabolic acidosis
- Na, H2O into cells>>hypovolemic shock>> renal vasoconstriction
- Myoglobin & ↓ renal perfusion>>ATN
- RX: volume, then HCO3, Ca++, mannitol

Acute radiation syndrome (CNS)

- Signs/sx depend on type, rate & dose or radiation received
- >30Gy: CNS/CV syndrome
  - free radicals destroy cell & basement membranes
  - electrolyte loss
  - edema
  - hypotension
  - death within 48 hrs

Acute radiation syndrome (GI)

- 8-30Gy:
  - N/V/D/cramps w/in 1-2 hrs, incr + fatigue @ 4-8 hrs
  - kills mucosal crypt stem cells>>bloody diarrhea>>death w/in 1-2 week



ARS: Hematopoietic syndrome

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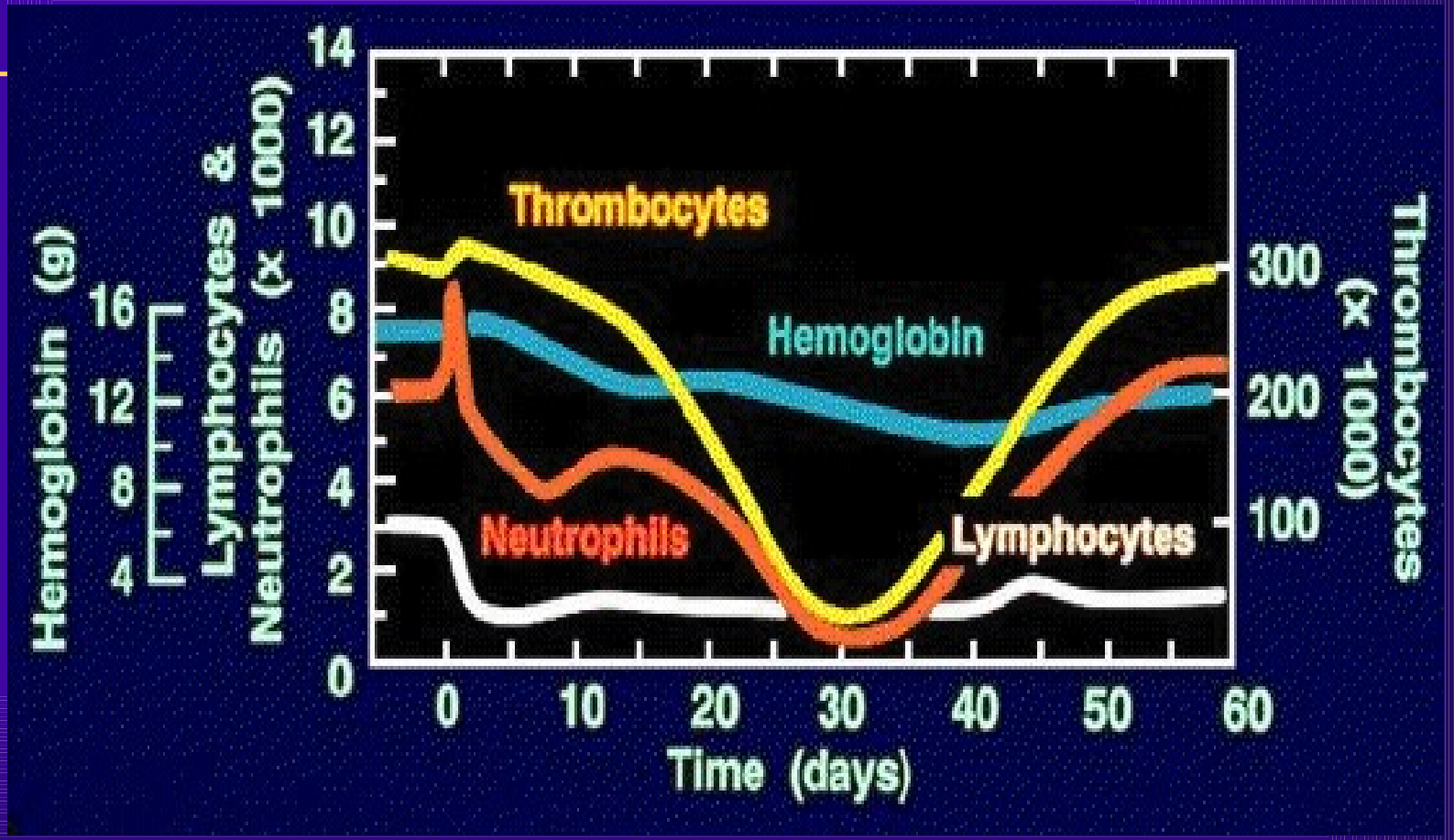

Symptoms @ 1-3 Gy exposure

- Prodrome: N/V @ 1-24 hours, easier to control than @ higher exposures
- Latent phase: up to one month
- Illness phase:
  - Neutropenic fevers
  - Localized & systemic infections
  - Hemorrhage
  - Survival depends on successful treatment

Management of ARS

- Cytokine therapy to stimulate cell lines
- Surgery/wound debridement w/in 48 hours
- Avoid iatrogenic infection
- Empiric treatment of neutropenic fevers
  - Gram negative coverage
  - Gram positive coverage
  - Antifungal therapy
  - Pneumocystis prophylaxis

Chemical Warfare Agents

- Blood Agents (cyanide)
- Blister Agents (mustards, phosgene oxime)
- Nerve Agents (Sarin, Soman)
- Choking Agents (Chlorine, Phosgene)

Features of CW Agents

- Man-made
- No use other than weapons
- Often have odor and taste
- Mist or droplet delivery
- Compared to toxins, less toxic and less types of effects

Clinical features of nerve agents

- Miosis of pupils (constriction)
- Wheezing (bronchoconstriction)
- Crampy abdominal pain (constriction)
- SLUD (salivation, lacrimation, urination, defecation)
- Muscle twitching/fasciculation f/b fatigue/paralysis

Treatment for nerve agents

- Pyridostigmine pre-treatment needed for Soman, perhaps Tabun—due to ageing
- Atropine—2-6 mg, then 2 mg q 5-10 min until secretions dry
- Pralidoxime chloride (2-PAM)—removes agent from AChE

Biological Agents

- Smallpox
- Anthrax
- Toxins

Anthrax

- Diagnosis
  - History & suspicion
  - ELISA 2.5 hrs; PCR 6 hrs; culture 8-20 hrs
- Treatment
  - IV penicillin, Cipro, or doxycycline
- Postexposure prophylaxis
  - Vaccination
  - Oral Cipro or doxycycline

Anthrax

- Gram positive sporulating bacillus, in soil
- Aerosolized spore easily made & spread
- Weaponized by several countries
- Highly lethal (90-100%)
- 1-6 day incubation, initial sx non-specific w/fever, malaise, non-prod cough
- Dyspnea, stridor, CP, wide mediastinum+/- pleural effusions herald death in 24-36 hrs

Toxins

- Botulinum
  - LD50 1 ng/kg—highly lethal!
  - Easy to make, weaponized by several countries
  - Prevents ACh release>>flaccid paralysis
  - Affects CNs before skeletal muscle
- Ricin
- Staph Enterotoxin B

Features of toxins

- Natural origin
- May have legitimate medical use
- No odor or taste
- Aerosol delivery
- Highly toxic and variety of effects

Combat Stress

- War is a significant stressor, with frequent physical and psychological sequelae
- Initial response:
  - maintain unit cohesion & contact
  - keep near front but provide short respite
  - emphasize it is a normal reaction
  - look for more severe dysfunction, w/ intrusion, avoidance, & hyperarousal (ASD/PTSD)

Post-deployment symptoms

- Common to soldiers from Civil War, World Wars, Korea, Vietnam, Gulf War
- Similar to primary care, but more symptoms
- Psych dx more likely w/ greater symptoms
- Management:
  - Establish rapport
  - H&P, directed tests only
  - Question re. depression, anxiety, & sleep d/o's

Summary

- Readiness/profiles/MEBs need attention
- Many conditions relevant to readiness & war are seen in daily medical practice:

*common symptoms *pneumothorax

*depression *neutropenic fevers

*anxiety *GI bleeds

*sleep disorders *rhabdomyolysis

Conclusion

It should be possible to provide some preparation for students and residents regarding war and readiness issues through extrapolation and careful emphasis during inpatient and outpatient care.